Java SE 6 on Snow Leopard

Session 405

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Java SE 6 on Snow Leopard

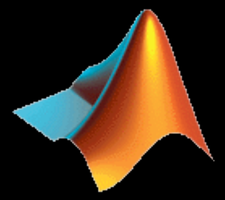
Tom O'Brien
Manager, Java Engineering

Java™

Java™

Mac OS X Snow Leopard
Version 10.6

12



delight
revel
love
enjoy
savour
bask
savor
relish
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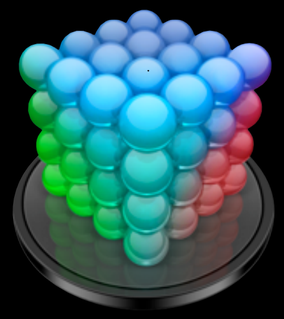

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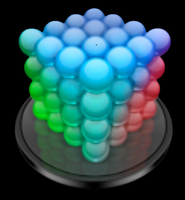
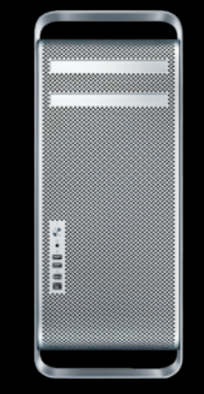




Java™

What We'll Cover

- Java in Mac OS X overview
- What's new in Snow Leopard
- Performance and tips
- Building and tuning your app for 64-bit
- SWT Cocoa

Java on Mac OS X

Built in since 2001

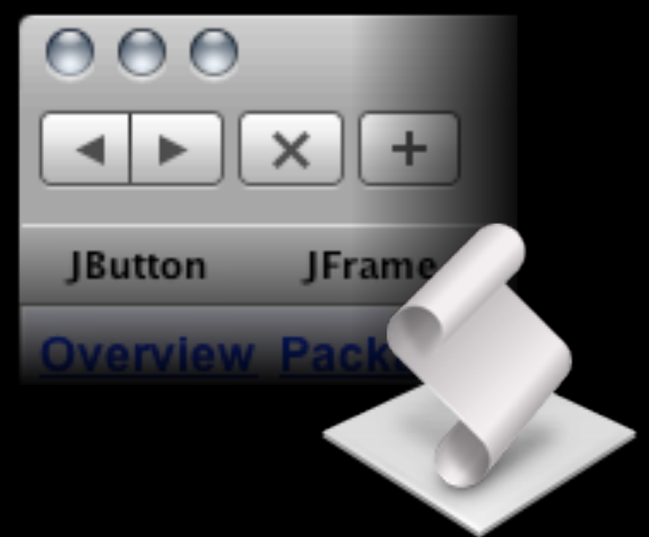
Java on Mac OS X

Java is a core feature of Mac OS X

- Applets
- Web Start applications
- Mac OS X bundled applications
- Command line and server

Java on Mac OS X

- Java deployment is integrated into Mac OS X
- Enhancements so your applications can fit in
  - Swing uses Aqua look and feel by default
  - Swing client properties
  - Uses Mac OS X font system, not flat files
  - Double-clickable application support
  - Dock, menu bar, scripting integration



Java on Mac OS X

- One preferred Java version per OS
- Focus of compatibility and enhancements
- Moved forward over time
- Mac OS X 10.4
  - J2SE 1.4
- Mac OS X 10.5
  - Java SE 5.0

Java on Mac OS X 10.5 Leopard

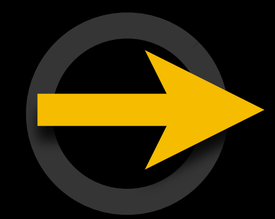
J2SE 1.4.2

Deprecated

Java SE 5.0

Preferred

Java SE 6

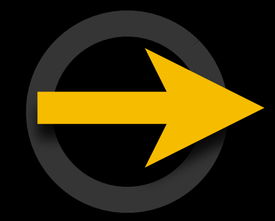


Developer

Java on Mac OS X 10.6 Snow Leopard

Java SE 6

Preferred



Developer

Java on Snow Leopard

- Java SE 6 preferred and only version
  - 64- and 32-bit Intel, optimized for 64-bit
- Higher performance Java 6 virtual machine
- New tools for profiling and debugging
- More…

New in Snow Leopard

Mike Swingler
Lead Java Runtime Engineer

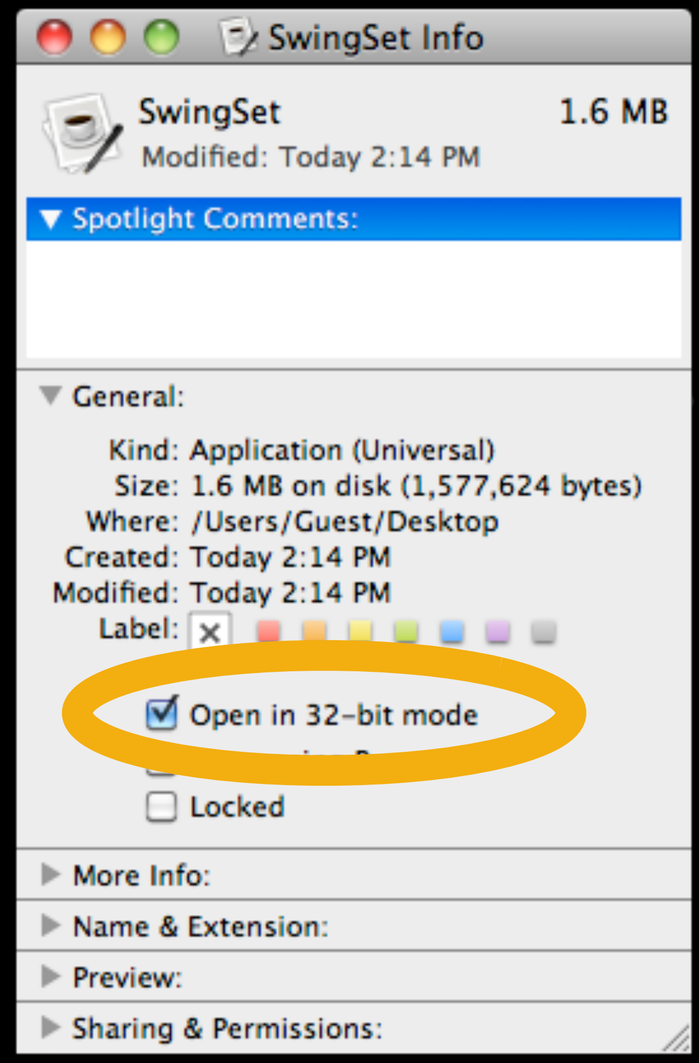
New in Snow Leopard

- Bundling your application
  - Changes in launching and your app's architecture
- Out of process applet plug-in
  - Using JNLPs to deploy your app
- VisualVM performance analysis tool
  - Demo

JavaApplicationStub

New

- New stubs (PPC, i386, x86_64)
  - Run in 64-bit by default
- Old stubs (PPC, i386) still launch
  - Continue to run in i386 only
- Architecture matters!
  - Only include architectures you support
  - “Run in 32-bit mode” works!
- LSArchitecturePriority

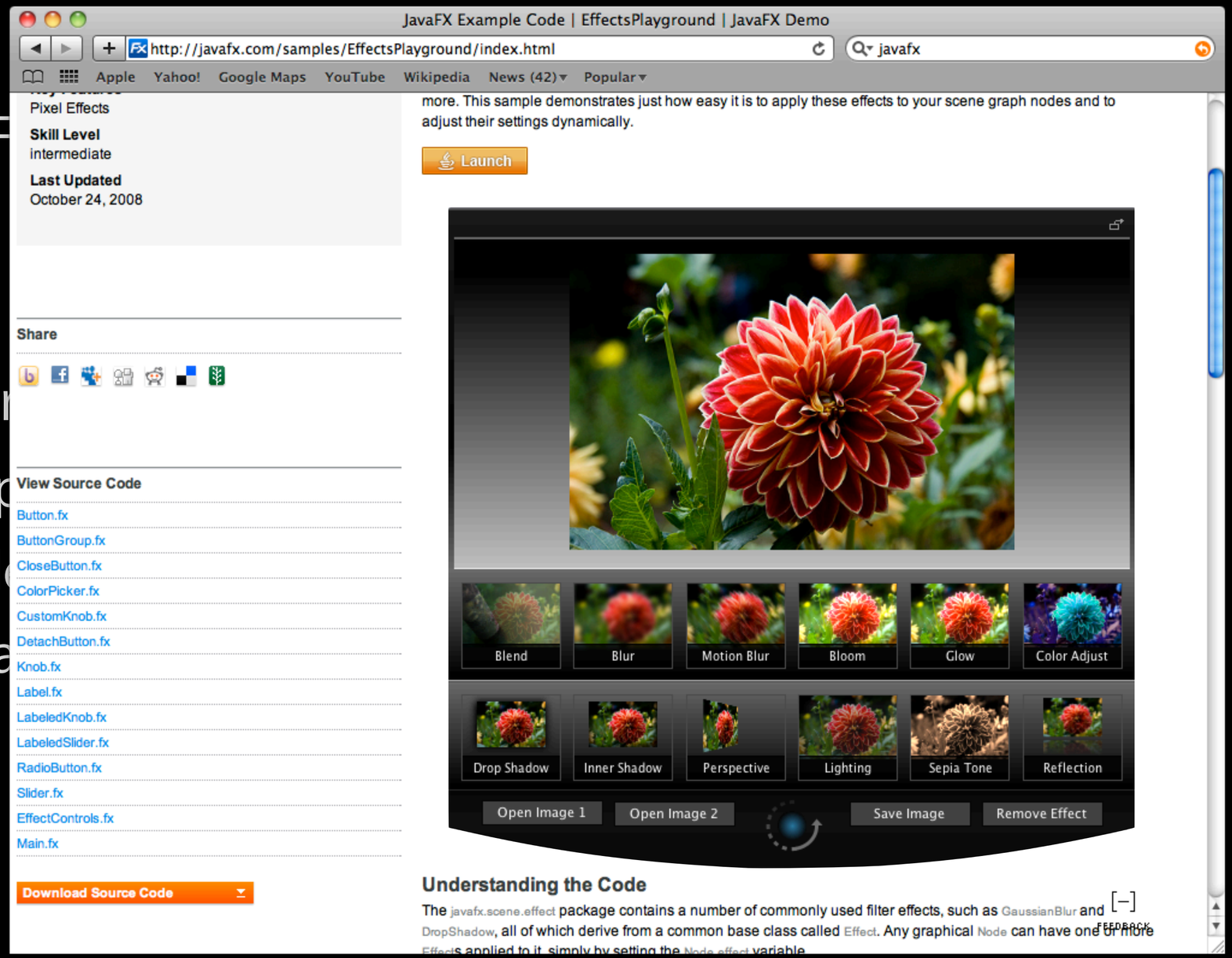


Bundling Your App

- Document associations
- Use a CFBundleIdentifier!
  - Standard Apple events
  - “Show in Finder” from the Dock
  - Spaces
  - Firewall
  - “Run in 32-bit mode”
- Created automatically by Web Start

Out of Process Applet Plug-in

- Safari 4 + F
- Stability
- Security
- Next-gener
  - Drag app
  - Create d
  - Launch a
- Developer



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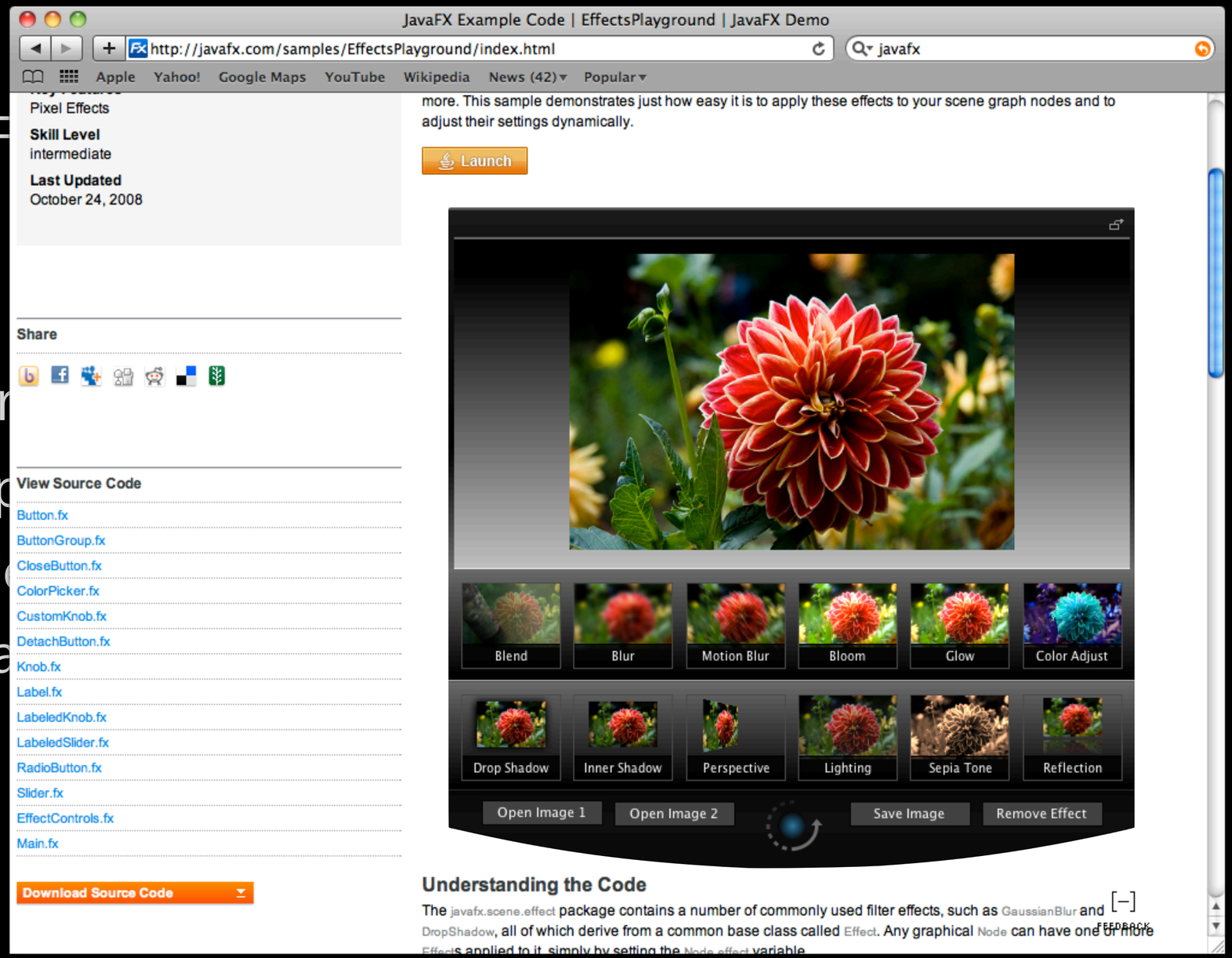
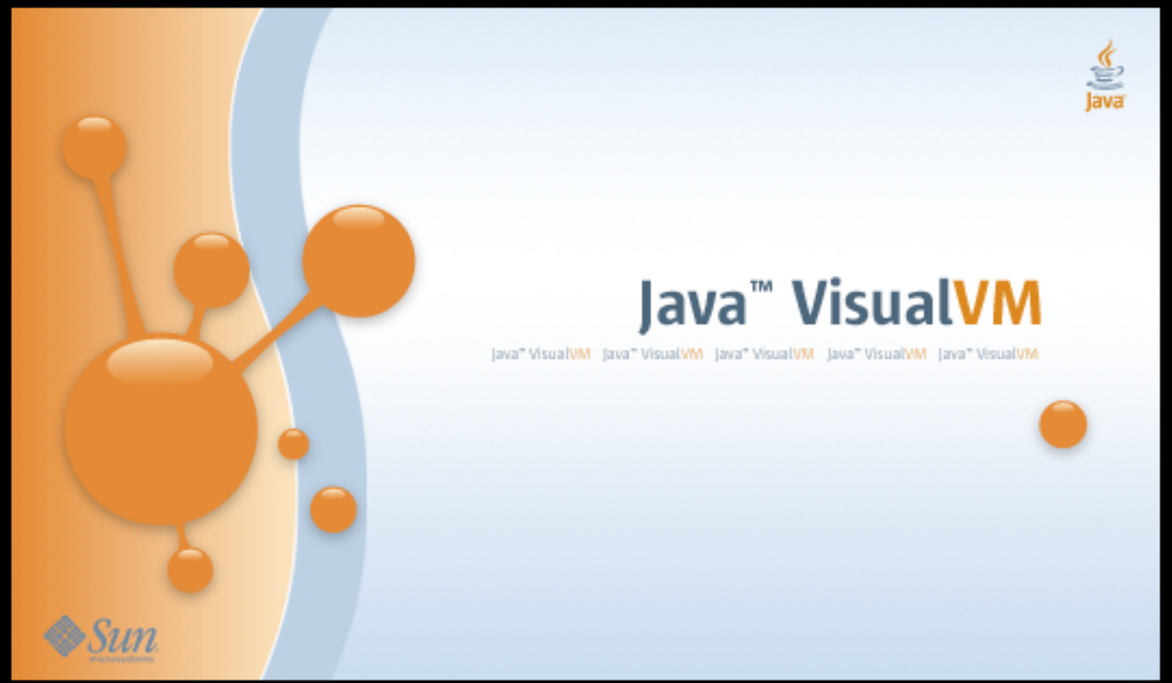


JNLP

VisualVM

- New to Java SE 6
- Stack dumps
- Instruments bytecode
- Heap dumps
  - Walks object graphs
- Plug-ins
- /usr/bin/jvisualvm



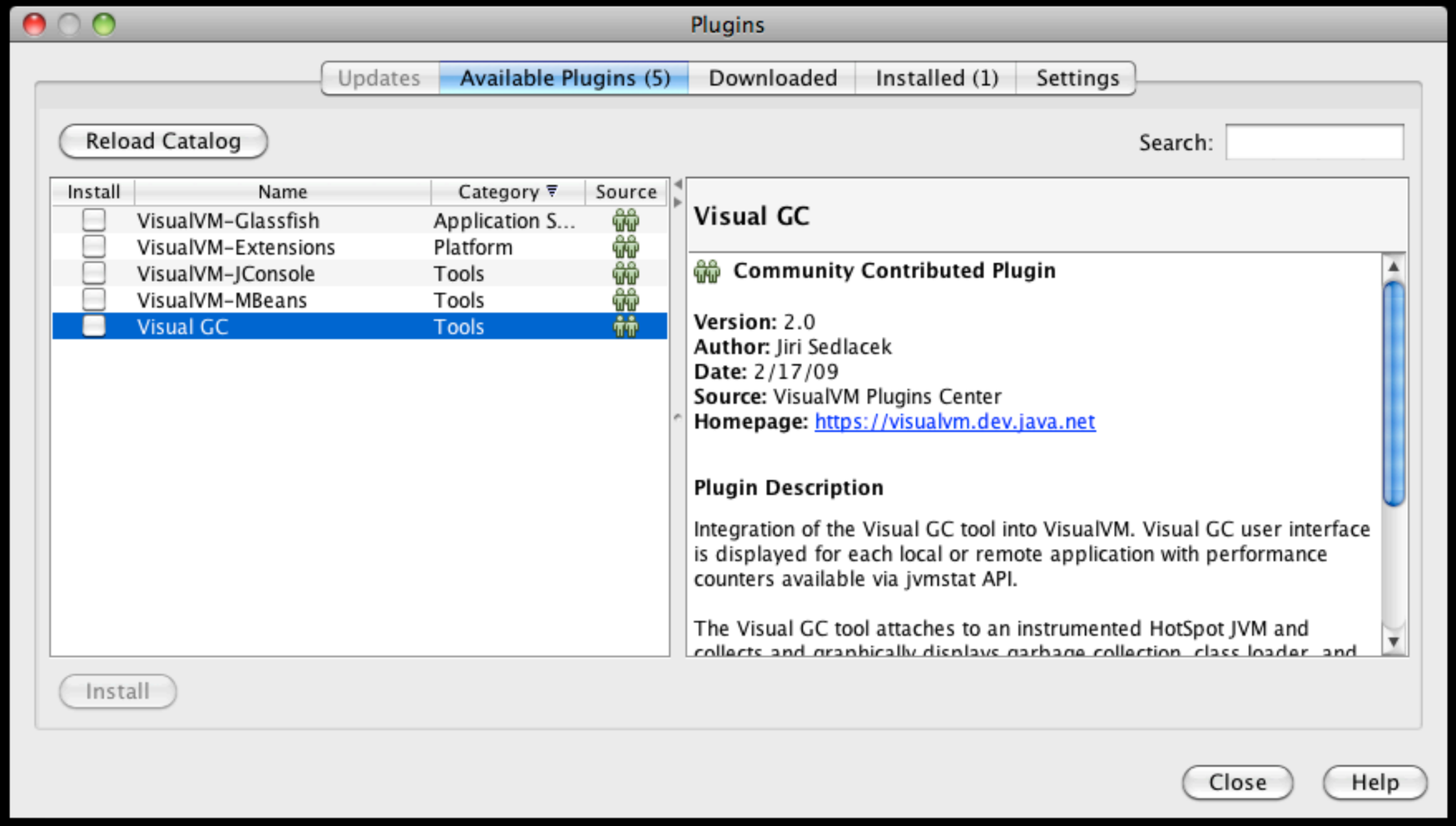
VisualVM Demo

Bino George
Java Runtime Engineer

Performance and Tuning—VisualVM

New

- Heap analysis
- CPU profile
- Memory profile
- Plug-ins
  - Glassfish
  - Visual GC
  - …and more



Performance

Pratik Solanki
Virtual Machine Engineer

Performance

- Java in Mac OS X Server and client
- Snow Leopard vs. Leopard
- New VM flags in Snow Leopard
- Changes in HotSpot

Mac OS X Server

Server

SPECjbb2005

64-bit Java SE 6

Testing conducted by Apple in May 2009 using a 2.93GHz 8-core Xserve (Early 2009) with 48GB RAM running a shipping version of Leopard Server v10.5.7 (SPECjbb2005 bops = 205,224, SPECjbb2005 bops/JVM = 51,306) and a prerelease version of Snow Leopard Server (SPECjbb2005 bops = 244,885, SPECjbb2005 bops/JVM = 61,221). SPEC® and SPECjbb2005® are trademarks of the Standard Performance Evaluation Corporation (SPEC); see www.spec.org for more information. Competitive benchmark results stated here reflect internal Apple testing and were submitted to SPEC in May 2009. For the latest SPECjbb2005 benchmark results, visit www.spec.org/osg/jbb2005. Performance tests are conducted using specific computer systems and reflect the approximate performance of Xserve and Mac OS X Server.

Performance Options

- Large Pages
  - `-XX:+UseLargePages`
  - `-XX:LargePageSizeInBytes` does not work
- Default is 4K pages
- Increases it to 2MB
- Up to 10% win!

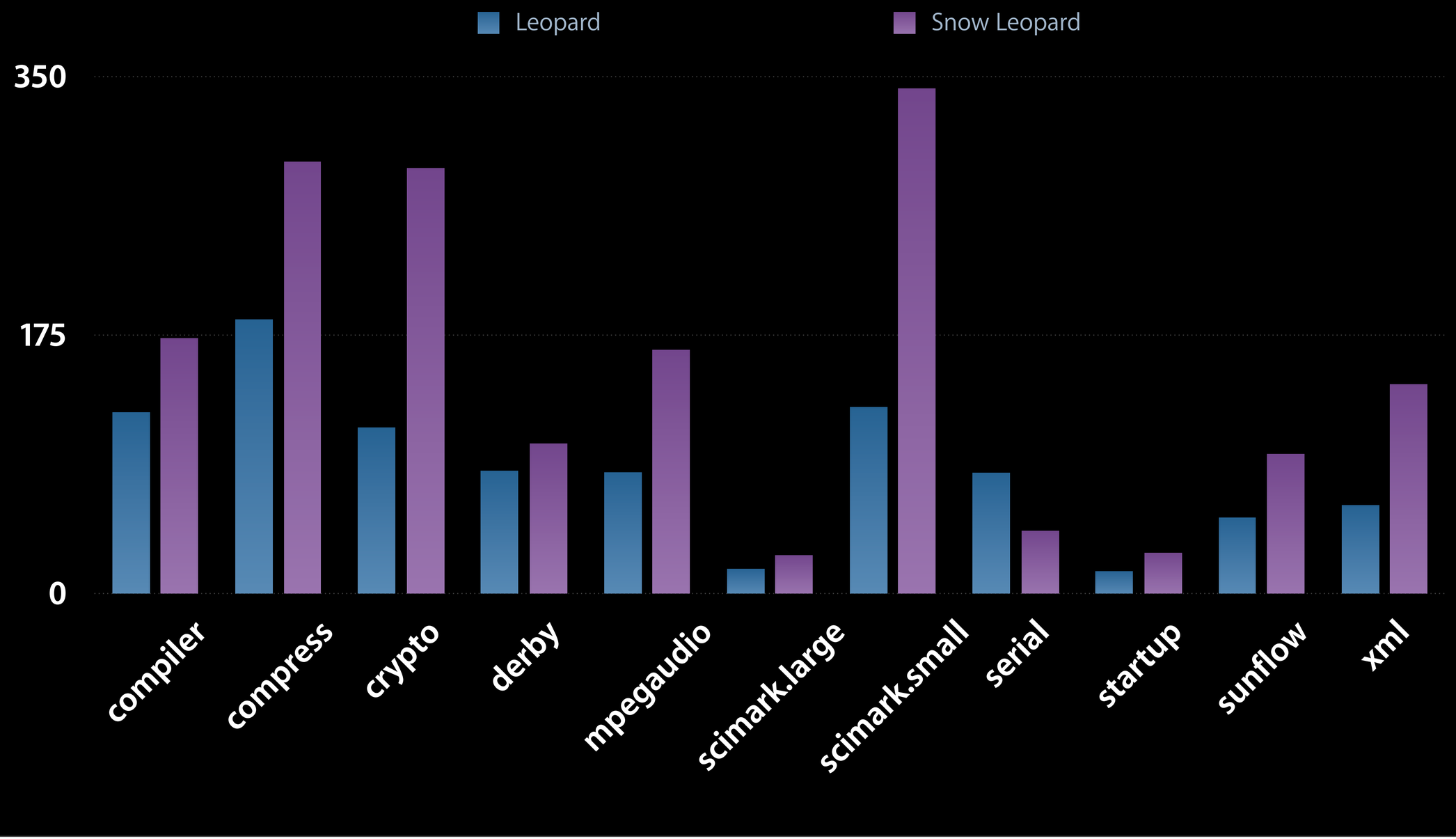
UseLargePages Caveats

- Works only on 64-bit kernel (K64)
  - `uname -m`
- Uses wired memory
- If needed, pass `-XX:+ExitOnLargePageFailure`

Mac OS X Client

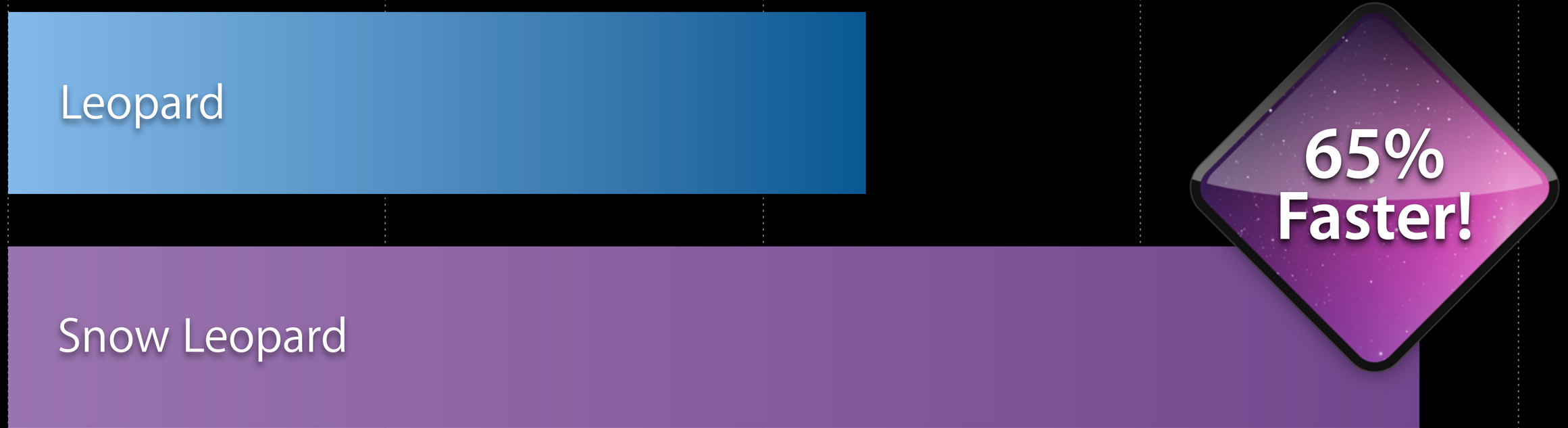
JVM Benchmark

Larger is better



JVM Benchmark

Larger is better



Snow Leopard

Leopard

Java SE 5

32-bit

Client VM

Server HotSpot VM Masquerading as Client

- Server VM is great for long running processes
- Default tweaked for “client” applications
  - Smaller compile thresholds
  - Faster startup time
- Passing `-server`, (default) higher thresholds

GC Ergonomics

- New in Java 6 on Mac OS X
- Enabled for "beefier" machines
  - At least two cores
  - At least 2GB RAM
- Enables Concurrent Mark Sweep (CMS) collector
  - Better UI responsiveness
- With `-server`, enables Parallel GC

Performance Summary

- Snow Leopard
- Java SE 6
- 64-bit
- Server VM

Your App and 64-Bit

Mike Swingler
Lead Java Runtime Engineer

Building and Tuning Your App for 64-Bit

- IDEs and tools
- Profiling
  - Graphics renderers
- Debugging
- JNI and Cocoa
- SWT

Integrated Development Environments

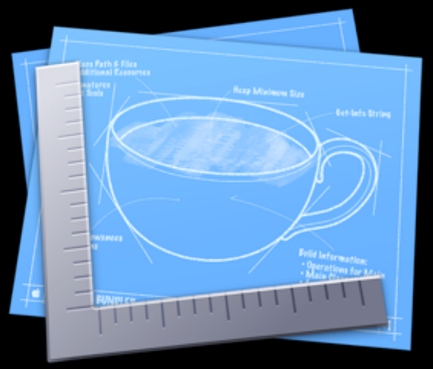
Eclipse

JetBrains IDEA

Netbeans

Xcode

Tools

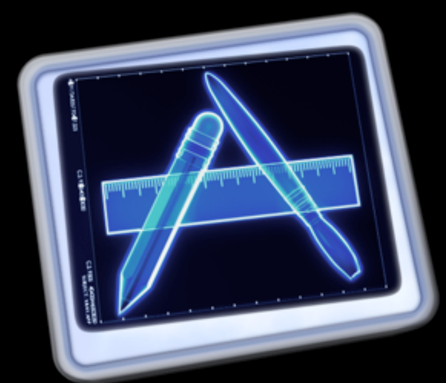


Jar Bundler

VisualVM

Icon Composer

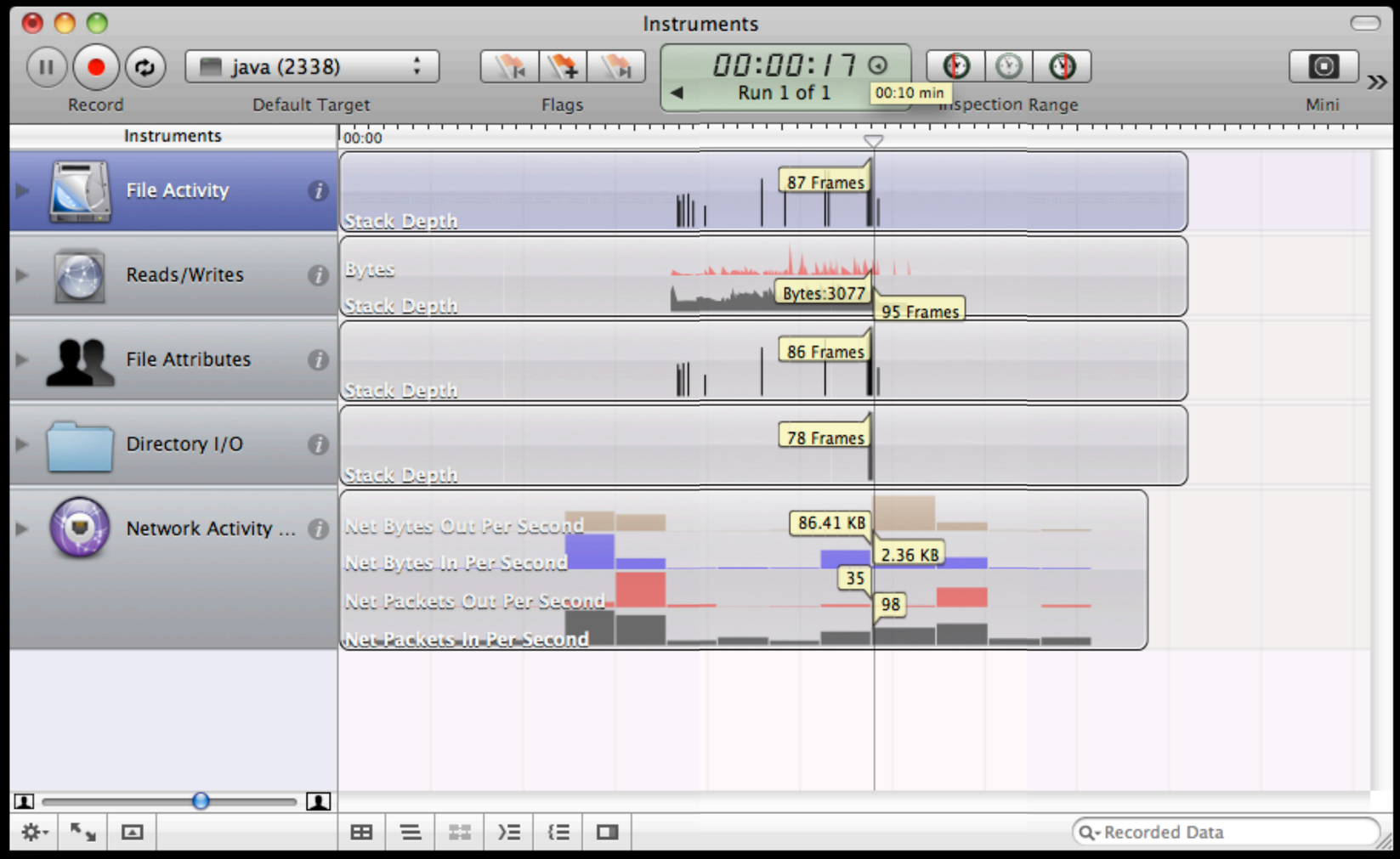
Property List Editor



Instruments

Profiling—Instruments

- Full system view
  - Network
  - File system
  - Dispatch queues
  - Power usage
  - Etc.
- Also handy for JNI



Profiling—Graphics Renderer

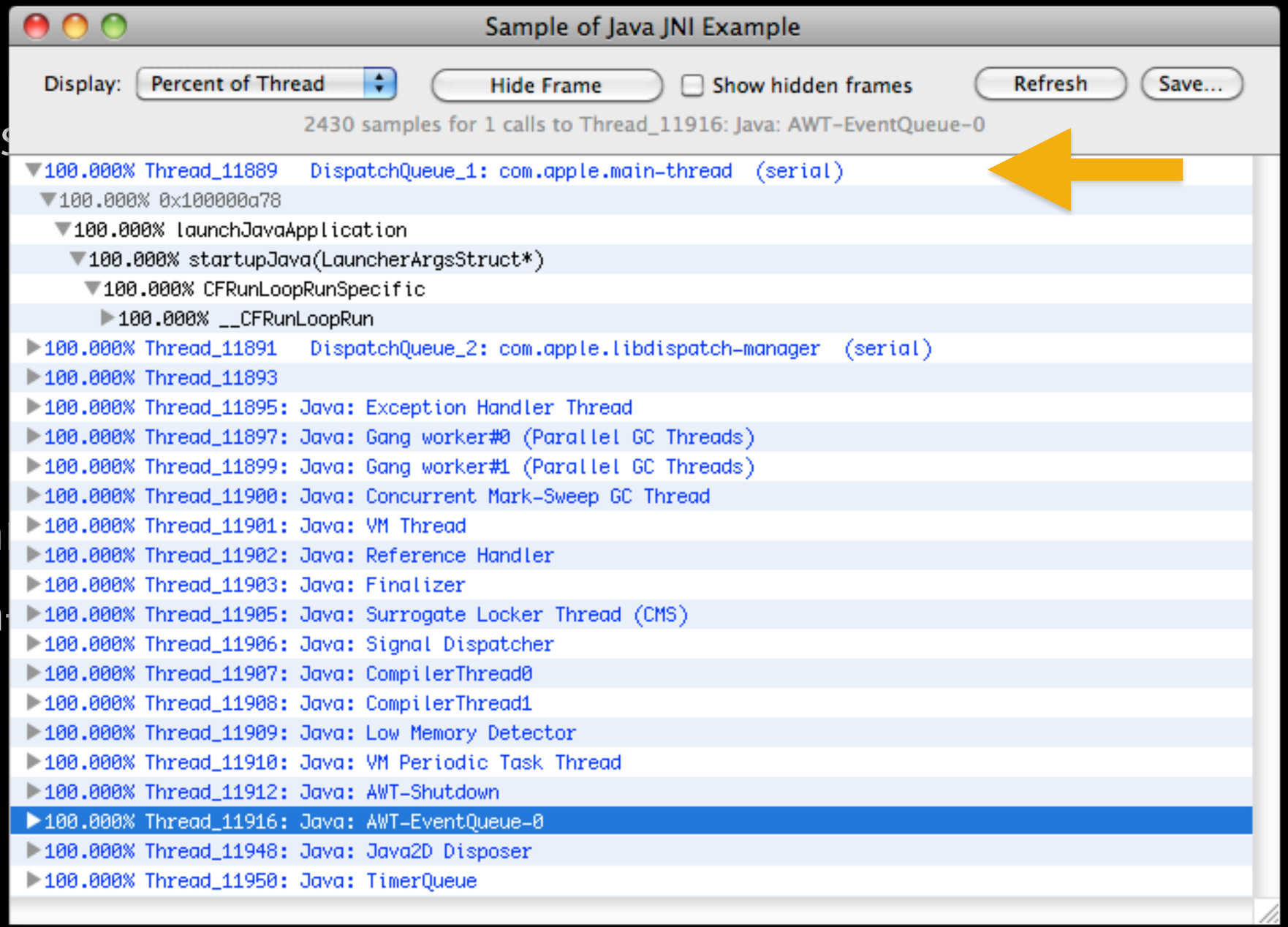
- Sun2D renderer
  - Default in Java 1.6+
  - Cross-platform compatible
  - Similar performance curve to other platforms
- Quartz renderer
  - Default in Java 1.5
  - Optimized for Mac OS X native image types
  - Faster for some things, slower for others
- Pick the one that is right for you

Debugging—DTrace

- Over 500 DTrace probe points unique to Java
- Most flexible/powerful way to inspect
  - HotSpot
  - Libc
  - Kernel
- Visualization with Instruments
- Pass `-XX:+ExtendedDTraceProbes` to enable expensive probes
- Many scripts available online

Debugging—Thread Names

- Java thread names
  - Crash Reporter
  - gdb
  - sample
  - Instruments
- Already named th
  - com.apple.main-



Debugging—UnsatisfiedLinkErrors

- More descriptive UnsatisfiedLinkErrors
  - library not found
  - symbol not found
  - found, but architecture not found

Missing architecture:

```
java.lang.UnsatisfiedLinkError: /Users/guest/Desktop/AddressBook JNI
Example/build/Debug/libAddressBook.jnilib:  no suitable image found.
Did Find:  /Users/guest/Desktop/AddressBook JNI Example/build/Debug/
libAddressBook.jnilib:  mach-o, but wrong architecture
```

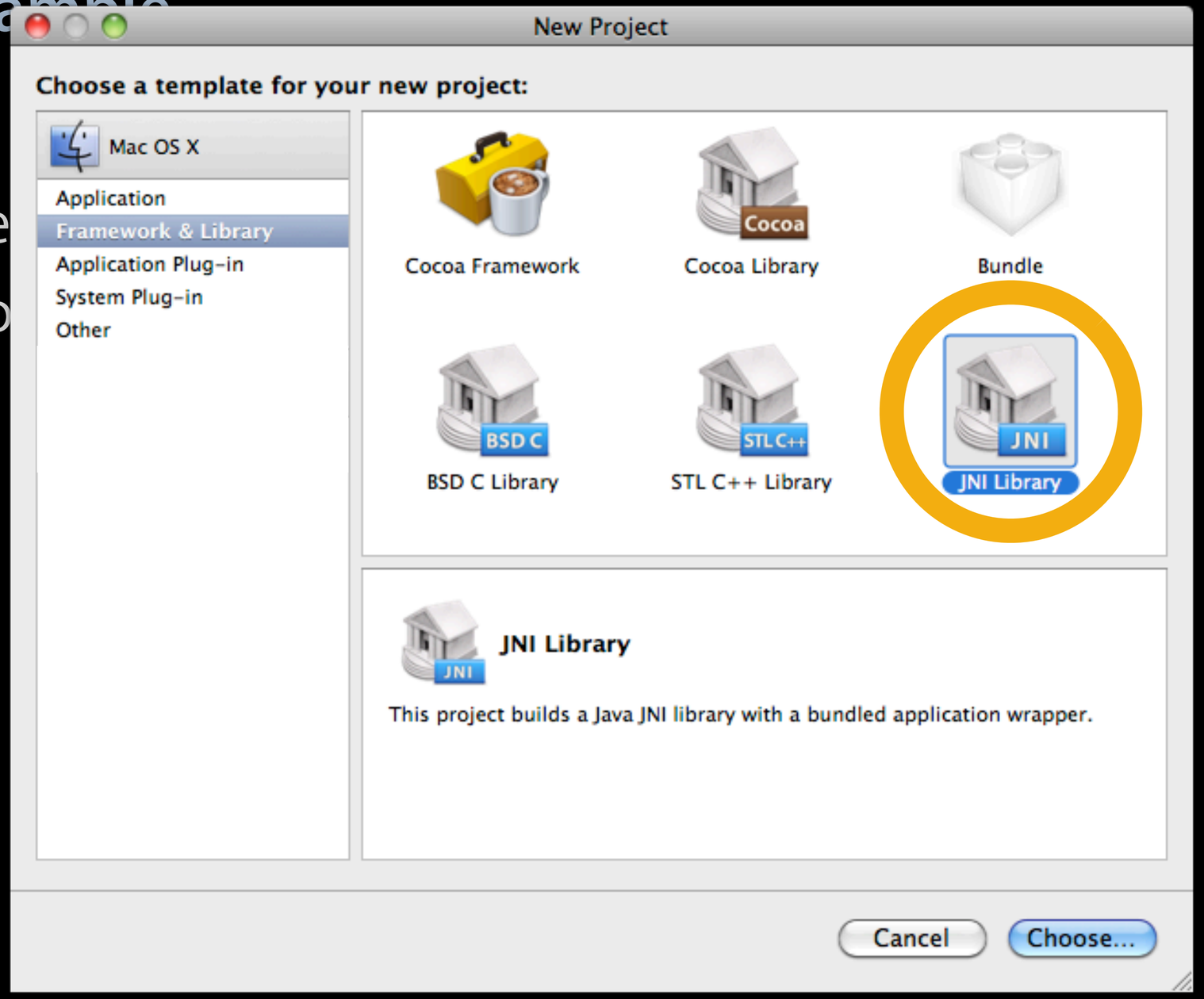
Missing dependent library:

```
java.lang.UnsatisfiedLinkError: /Users/guest/Desktop/AddressBook JNI
Example/build/Debug/libAddressBook.jnilib:  Library not loaded:
/System/Library/Frameworks/AddressBook.framework/Versions/A/
AddressBook   Referenced from: /Users/guest/Desktop/AddressBook JNI
Example/build/Debug/libAddressBook.jnilib   Reason: image not found
```

JNI and Cocoa

New Java JNI library example

- Full Swing application
- Calls into Mac OS X Addre
- Uses JavaNativeFoundatio



JavaNativeFoundation.framework

- `JNF_COCOA_ENTER() / JNF_COCOA_EXIT()`
  - Automatic autorelease pools and exception handling
- `JNFException`
  - Unified Java/ObjC exception handling
- `JNFJObjectWrapper`
  - Foundation-level wrapper for JNIGlobalRefs
- `JNFTypeCoercer`
  - Converts strings, numbers, lists, maps, sets

SWT

Scott Kovatch
Senior Computer Scientist
Adobe Systems Inc.

SWT

- Began as Carbon 32-bit
- Cocoa 64-bit is the future of Mac OS X
- Effort to port Eclipse to Cocoa began last year
- Cocoa SWT now an officially supported platform
- Default version for Eclipse 3.5 on Mac OS X

Demo

Cocoa SWT

Cocoa SWT

- Mark window modified bit
- Date picker
- Sheet support
- Search fields
- Native text services
- Unified toolbar API
- Drag-and-drop feedback
- 64-bit

SWT Developers

- Download Eclipse 3.5 Cocoa
  - download.eclipse.org/eclipse/downloads
- Transition your SWT app to Galileo

What We've Seen Today

- Java is built into Mac OS X
- New features in Snow Leopard
- Great Java SE 6 performance in Snow Leopard
- Tune your app with VisualVM and Instruments
- Building your app for 64-bit
- SWT developers switch to SWT/Cocoa

More Information

Matt Drance
iPhone and Mac Application Frameworks Evangelist
mdrance@apple.com

Apple Java developer mailing list
java-dev@lists.apple.com

Snow Leopard developer forums
http://devforums.apple.com

Java Development Guide for Mac OS X (revised for Snow Leopard)
http://developer.apple.com/snowleopard/library/documentation/Java/

Send us your bugs!
http://bugreport.apple.com

Lab

Mac OS X Lab Open Hours	Graphics and Media Lab B Friday 9:00AM

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